

East Twin River Trout Survey-2015

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The East Twin River flows southeastward through southern Kewaunee County and northern Manitowoc County before entering Lake Michigan in the City of Two Rivers. Upper sections of the watershed are conducive for trout and have been classified as trout waters by the DNR. Trout populations in these upper watershed streams are a mixture of native trout (brook trout), stocked trout (brown trout) or recently colonizing trout (rainbow trout).

The purpose of the study described in this report was to determine the status of trout in the classified trout waters of the East Twin River using the Index of Biotic Integrity (IBI) and catch per effort data for trout (CPE). By quantifying the type and number of fish species, we can judge the current condition of the fish population in the East Twin River and compare the 2015 results to previous stream surveys.

This survey found that fish populations in the East Twin River have generally remained stable since the 2001 survey although Brook Trout numbers downstream of HWY 29 have declined sharply after the 2006 fish kill.

Water quality within the watershed is generally good as indicated by dissolved oxygen levels greater than 7 PPM and cool temperatures.

Streams within this system are well buffered and feature a variety of large-scale and small-scale habitats for aquatic organisms.

Based on survey results, it is recommended that stream bank protection programs be used to protect the fishery and stream habitat by protecting critical areas such as stream banks and groundwater seeps, that staff work with other DNR staff to ensure that waste water discharge permits (WPDES) protect fish, habitat, water quality and stream temperature and that Fisheries staff continue to survey the stream and monitor the recovery of the Brook Trout population and if the trout population fails to increase consider habitat improvement projects and stocking to improve numbers.

INTRODUCTION

The East Twin River is a large, low gradient stream that flows 34.5 miles through mostly agricultural land on its way to Lake Michigan (Figure 1). Upper sections in Kewaunee County are slightly stained and classified as either Class 1 or Class 2 trout waters. Stream corridors are well buffered by forests and numerous groundwater seeps are present. Stream bottom sediments range from all sand to all silt with bedrock and gravel present in some stream reaches. Although fish surveys have been conducted infrequently on the East Twin River, they have found a wide variety of gamefish which range from trout in upper reaches, to Smallmouth Bass and Northern Pike in middle reaches to Lake Michigan species in the area near Lake Michigan.

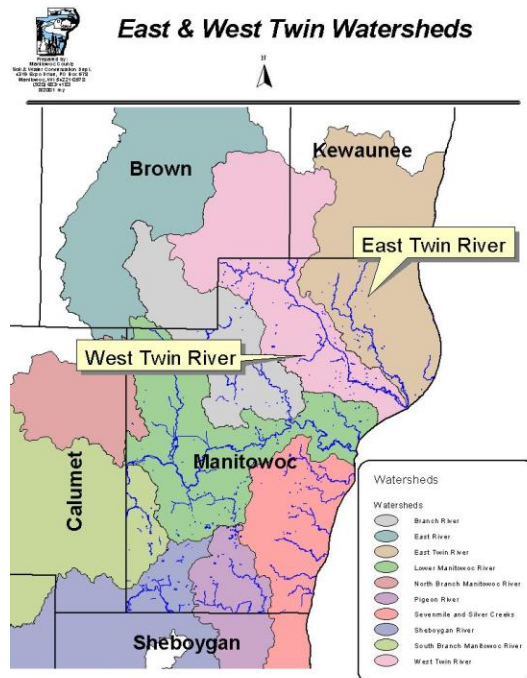


Figure 1. The East Twin River Watershed is located in southern Kewaunee and northeastern Manitowoc Counties.

The most recent series of fish surveys were conducted in 2001 (Hogler and Cahow 2002), 2009 (Hogler and Surendonk 2009) and 2011. The 2001 survey found self-reproducing Brook Trout above HWY 29 in the Class 1 section of the river and stocked Brown Trout at HWY J in the Class 2 section (below HWY 29) of the river. Diverse assemblages of forage fish were captured at both locations. In 2006, discharges from a nearby cheese factory caused a large fish kill in the Class 2 section of the East Twin River (Hogler 2006). During the investigation when staff walked the stream they found representatives of many species dead including at least 50 Brook Trout. Results from the follow-up surveys conducted in 2009 and 2011 found that the Class 1 waters were similar to the 2001 survey with reproducing Brook Trout and forage fish in this stream segment. However, in

2009 and 2011 few trout were captured in the Class 2 section of the river. In 2009, only one Rainbow Trout was captured in the Class 2 section of the East Twin River and no trout were captured in 2011. A diverse mixture of forage fish were captured in the Class 2 section in both years similar to what was captured in 2001.

The purpose of the 2015 study described in this report was to determine the status of trout in the East Twin River by using the Index of Biotic Integrity (IBI) and catch per effort (CPE) data. By quantifying the type and number of fish species, we can judge the current condition of the fish population in the stream, then compare 2015 results to previous stream surveys.

METHODS

Streams and survey segments were randomly selected using protocols developed for Tier 1 monitoring of Wisconsin trout waters. Actual survey locations were selected based on professional judgment, past survey locations and management need. In 2015, four stations were electroshocked to assess fish populations. These stations included stations surveyed in 2001 (Townline Road north of HWY 29 and HWY J), a station added and surveyed in 2009 and 2011 (Krok Road) and a new station in 2015 (Krok Road Bridge). All stations were at least 100 meters in length. Fish were collected in a single upstream pass using either a standard backpack electroshocking unit in small stream segments or a stream shocker in larger stream segments. All fish were netted, identified, counted and gamefish length was measured to the nearest millimeter.

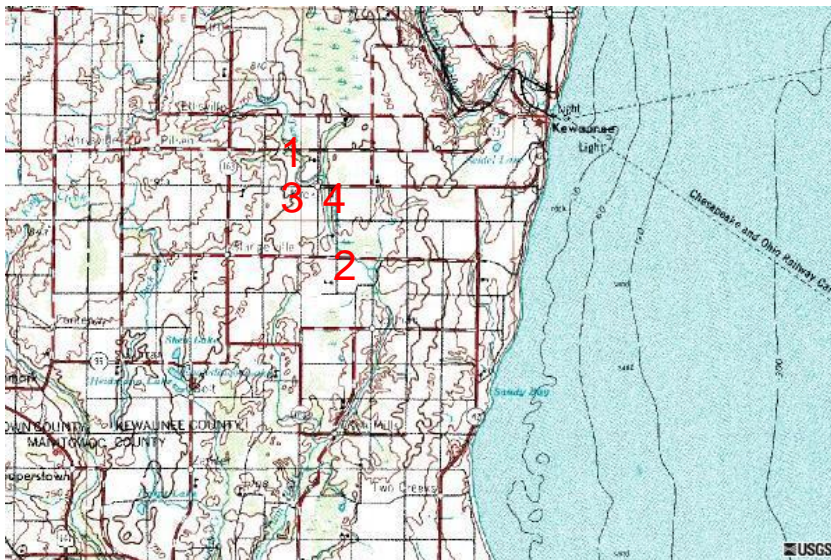


Figure 2. Trout sampling locations on the East Twin River surveyed in 2015. Site 1 is upstream of Townline Road, site 2 is at HWY J, site 3 is on Krok Road and site 4 is Krok Road Bridge.

Other variables that were measured while on site included air and water temperature, dissolved oxygen, percent oxygen saturation, flow and habitat was qualitatively rated (Simonson et al 1994). Qualitative scores can range from 0 to 100 with scores less than 25 indicating poor habitat, 25 to 49 fair habitat, 50 to 74 good habitat and scores above 74 indicating excellent habitat. Within the scoring matrix, items that are rated include buffer width, bank erosion, pool depth, stream width to depth ratio, riffle to riffle distances, fine sediment coverage and cover for fish. Streams that score high on the rating index have diverse habitats, deep pools and no erosion. Streams that score low include those that have limited buffers, shallow water, erosion, sediment deposition and little fish habitat.

The Index of Biotic Integrity (IBI) based on the fish community at each sampling location was calculated using excel spreadsheets for cold water communities (Lyons 1992). IBI scores can range from 0 (poor) to 100 (excellent). Fish communities that receive poor IBI scores have few coldwater species and many species tolerant to warmwater or disturbed habitat while streams with high scores have many coldwater species of fish, and species intolerant to habitat disturbances. All sampling was conducted in July 2015.

RESULTS

Townline Road

The station at Townline Road was located upstream of the road and ran for 150 meters (starting location N44.4450, W-87.6440). At this location, the East Twin River is a 3rd order stream with a gradient of 1.15 meters per kilometer and a sinuosity of 1.45:1. The surveyed section of river ran through mainly a shrub-woodland landscape (Figure 3).

This station was surveyed on July 6 during the morning hours. At the time of survey the air temperature was 16° C, the water temperature was 14.3° C, and the stream dissolved oxygen (DO) was 75% saturated at 7.5 mg/l.

The water level in the stream was judged to be normal for the time of year and was clear. Flow was measured at 0.015 cubic meters per second (CMS).



Figure 3. Fisheries staff member using a backpack shocker upstream of Townline Road on the East Twin River. At this location the stream is well buffered and runs through a shrub-woodland complex.

A backpack shocker was utilized to survey the 150 meter station above Townline Road. During the 20 minutes of shocking, we captured 44 individual fish representing seven species (Table 1). This catch resulted in an IBI score of 70, which is indicative of a fair to good coldwater fish community.

Table 1. The species mix and abundance of fish captured during electroshocking upstream of Townline Road on the East Twin River.

Species	Number	Catch #/ 100 meters
Brook Trout	16	10.7
Mottled Sculpin	12	8.0
Central Mudminnow	8	5.4
Pearl Dace	3	2.0
Brook Stickleback	2	1.3
Finescale Dace	2	1.3
Creek Chub	1	0.7
Total	44	29.5

Brook Trout and Mottled Sculpin dominated the catch followed by Central Mudminnow. The sixteen captured Brook Trout ranged in length from 56 mm to 293 mm in length with an average length of 124 mm. Six captured Brook Trout (38%) were greater than 150 mm in length, and three (19%) were greater than 200 mm in length (Figure 4). It appears from length frequency that at least three age classes of brook trout were present in our sample (Figure 5). Brook trout CPE was 10.7 per 100 meters shocked.



Figure 4. A photograph of the 293 mm Brook Trout captured during electroshocking on the East Twin River at Townline Road in 2015.

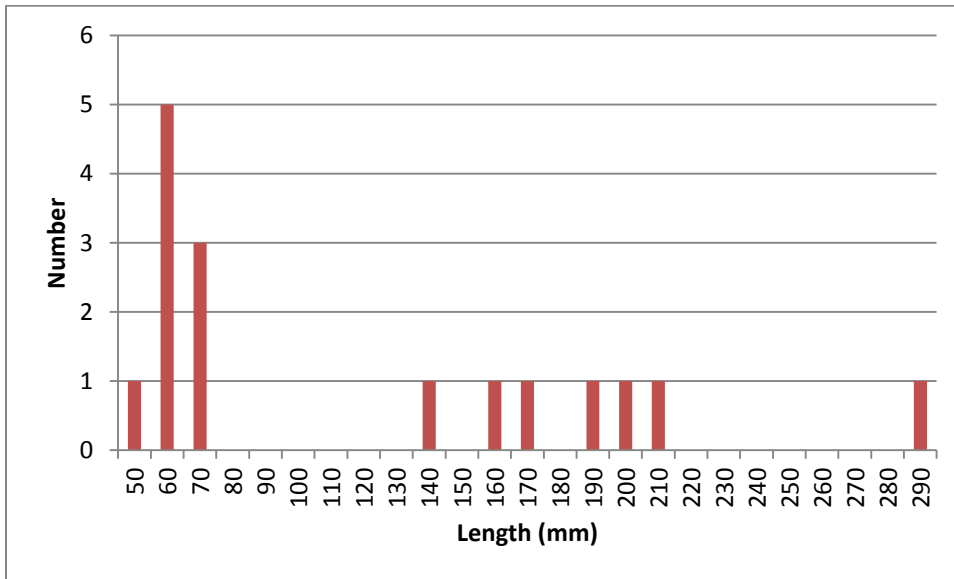


Figure 5. Brook trout length frequency of fish captured and measured during electroshocking at Townline Road.

Following shocking, staff evaluated stream habitat using the qualitative habitat scoring sheet. At this location the river had high rankings for buffer width and for limited bank erosion. It scored low in depth and because of the presence of extensive fine sediment coverage throughout the site and lack of fish habitat. Overall the stream at this location scored 43 points indicating fair qualitative habitat.

Krok Road

The station at Krok Road was located between Church Road and Townline Road where the river crosses into the ditch line of the road (starting location N44.4249, W-87.6412). At this location, the East Twin River is a 3rd order stream with a gradient of 1.13 meters per kilometer and a sinuosity of 1.85:1. The river at this location runs through a grassland-shrub complex (Figure 6).



Figure 6. This photo looks upstream at the East Twin River near Krok Road.

The survey at this location was conducted on July 6 during morning hours. At the time of the survey the air temperature was 17° C, the water temperature was 17.1° C and the DO in the stream was 79% saturated at 7.4 mg/l.

Water level was judged to be normal for this time of year and the water was clear. Flow was measured at 0.07 CMS.

A backpack shocker was utilized to survey the 105 meter station at Krok Road. During the 24 minutes of shocking, we captured 191 individual fish representing eight species (Table 2). This catch resulted in an IBI score of 50, which is indicative of a fair coldwater fish community.

Table 2. The species mix and abundance of fish captured during electroshocking near Krok Road on the East Twin River.

Species	Number	Catch #/ 100 meters
Pearl Dace	68	64.6
Creek Chub	34	32.3
Central Mudminnow	30	28.5
Common Shiner	29	27.6
Mottled Sculpin	16	15.2
Redside Dace	7	6.7
White Sucker	6	5.7
Brook Trout	1	1.0
Total	191	181.5

Pearl Dace dominated our catch, followed by Creek Chub (Table 2). One Brook Trout was captured that was 210 mm in length.

Following shocking, staff evaluated stream habitat using the qualitative habitat scoring sheet. At this location the river had high rankings for buffers and limited bank erosion and low rankings for shallow depth and lack bends and riffles. Overall the stream at this location scored 67 points, indicating good qualitative habitat.

County Highway J

The East Twin River at HWY J (starting location N44.4003, W-87.6144) is a 3rd order stream that has a gradient of 0.53 meters per kilometer and a sinuosity of 1.87:1. The lower portion of the station appears to have been channelized to allow for easier passage under HWY J. This station is characterized as following through a woodland complex that contains a mixture of tree species (Figure 7).



Figure 7. Looking upstream at the East Twin River at HWY J as it flows through a woodland complex.

We surveyed this location on July 6 during the morning hours. At this time the air temperature was 27° C, the water temperature was 19.9° C and the DO of the stream was 89% saturated at 7.9 mg/l.

Flow was measured at this location at 0.14 CMS. Water level was judged to be near normal for this time of year and was clear.

We used a stream shocker with 3 probes at this location to capture fish. In 20 minutes of shocking we captured 265 individual fish representing 15 species (Table 3).

Central Mudminnow and Creek Chub dominated the catch, with fewer individuals of other species captured (Table 3). Nine Brown Trout ranging in length from 235 mm to 295 mm with an average length of 265 mm and two Rainbow Trout, 163 mm and 173 mm in length were captured. It is likely that the Brown trout were from WDNR stocking in 2015 and the Rainbow Trout were naturally reproduced. One Yellow Perch was also captured at this location. The species mix at this location resulted in an IBI score of 20, indicating a poor coldwater fish community at this location.

Table 3. The species mix and abundance of fish captured during electroshocking upstream of HWY J on the East Twin River.

Species		Fish #/ 100 meters
Central Mudminnow	70	48.3
Creek Chub	56	38.6
Common Shiner	29	20.0
Hornyhead Chub	27	18.6
White Sucker	21	14.5
Mottled Sculpin	18	12.4
Southern Redbelly Dace	16	11.0
Pearl Dace	10	6.9
Brown Trout	9	6.2
Brook Stickleback	2	1.4
Green Sunfish	2	1.4
Rainbow Trout	2	1.4
Johnny Darter	1	0.7
Redside Dace	1	0.7
Yellow Perch	1	0.7
Total	265	182.9

Following shocking, staff evaluated stream habitat using the qualitative habitat scoring sheet. At this location the river had high rankings for buffers, limited erosion and fish cover and lower rankings for depth and extensive fine sediment coverage and limited habitat diversity. Overall the stream at this location scored 62 points indicating good qualitative habitat.

Krok Road Bridge

The station at Krok Road Bridge (starting location N44.4289, W-87.6293) was located just downstream of the Krok Road station and it had similar size and gradient. The river at this location runs through a grassland-shrub complex (Figure 8).

The survey in Krok Creek was conducted on July 1 during the early afternoon. At the time of the survey the air temperature was 17.1° C, the water temperature was 14.0° C and the DO in the stream was 82% saturated at 8.3 mg/l.

Water level was judged to be normal for this time of year and the water was clear. Flow was measured at 0.15 CMS.



Figure 8. Looking upstream on Krok Creek upstream of the Krok Road Bridge.

We used a backpack shocker to sample the 170 meter station above the Krok Road Bridge. During the 25 minute shocking assessment, we captured 140 individual fish representing seven species (Table 4).

Table 4. The species mix and abundance of fish captured during electroshocking upstream of the Krok Road Bridge on the East Twin River.

Species	Number	Fish #/ 100 meters
Pearl Dace	62	36.6
Central Mudminnow	54	31.9
Mottled Sculpin	11	6.5
Common Shiner	7	4.1
Creek Chub	3	1.8
Brook Trout	2	1.2
Johnny Darter	1	0.6
Total	140	82.6

Pearl Dace and Central Mudminnow dominated the catch, with substantially fewer fish of other species captured (Table 4). The species mix at this location

resulted in an IBI score of 50 indicating a fair coldwater fish community at this location.

Following shocking, staff evaluated stream habitat using the qualitative habitat scoring sheet. At this location the river had high rankings for buffers width and low rankings for depth, extensive fine sediment coverage and limited habitat diversity. Overall the stream at this location scored 52 points indicating good qualitative habitat.

DISCUSSION

Following Wisconsin stream sampling protocols for trout, we surveyed four stations on the East Twin River to assess the status of the trout population. The work in 2015 was similar to work that was done in 2001 (Hogler and Cahow 2002), 2009 (Hogler and Surendonk 2009) and 2011. In addition to electrofishing to assess the fish population at each site, we measured DO, flow and qualitatively assessed habitat.

Fish Populations

Fish populations, other than trout, appear to be relatively stable in the East Twin River despite the 2006 fish kill that caused severe mortality to fish of all species from Highway 29 downstream to at least Krok Road Bridge and likely beyond (Appendix 1). Trout populations appear to stable above Highway 29, while below HWY 29 they are lower than before the 2006 fish kill, although in 2015 our catch of trout improved as compared to 2009 and 2011 catches. IBI scores have improved at 2 of 3 of our long term survey sites while at HWY J the score was unchanged (Table 5).

Table 5. IBI rankings and scores for upper East Twin River Watershed streams from surveys conducted in 2001 and 2009 and 2015.

Location	2001	2009	2015
Townline Road	50- Fair/Good	50- Fair/Good	70- Good
Near Krok Road	--	20- Poor	50- Fair
Highway J	40- Fair	20- Poor	20- Poor
Krok Road Bridge	--	--	50- Fair

Catches of stocked Brown Trout and naturalized Rainbow Trout at HWY J and Brook Trout at the two Krok Road locations may be an indication of improving river conditions for trout and could signal an improvement in trout population number in the East Twin River

Temperature and Dissolved Oxygen

At each of the 4 sites, measured dissolved oxygen levels and water temperatures were adequate to support trout populations, although stream water temperature at HWY J was warmer than ideal for Brook Trout.

Flow

Similar to temperature and DO, measured flow in 2015 was very similar to what was measured in previous surveys and was sufficient not to limit the communities found in each stream. This is not surprising since this river owes a high percentage of its flow to groundwater inputs rather than from surface flow although discharge from the Cheese Factory contributes over 150,000 gallons per day which results in more consistent stream flows than in systems that are exclusively surface water drained.

Habitat

Habitat in 2015 was assessed qualitatively at each of the survey sites. Scores from the ratings ranged from a low of 43 at Townline Road to a high of 67 at Krok Road. All streams scored well for having wide buffers and limited bank erosion. If a stream had a low score it was likely because of shallow water, monotonous habitat and widespread fine sediment coverage.

The East Twin River above Townline Road was surveyed for qualitative habitat in each survey year. Habitat ratings at this location has decreased from good to fair because of increased amounts of fine sediment within the stream channel. This may be due to changes in the stream channel because of several recent flooding events or may be due to upstream discharges. Habitat at the other survey locations appears to be good although shallow water and fine sediments may reduce the quality of the habitat for trout.

CONCLUSIONS

- Brook trout populations in the East Twin River above HWY 29 have remained stable between 2001 and 2015. Trout numbers in the East Twin River below Highway 29 have declined since 2001, but catches of stocked Brown Trout and naturalized Rainbow Trout at HWY J and Brook Trout at the two Krok Road locations may be an indication of improving trout populations in the East Twin River.
- Water quality within the watershed is generally good as indicated by dissolved oxygen levels greater than 7 PPM and cool temperatures.

- Streams within this system are well buffered and feature a variety of large-scale and small-scale habitats for aquatic organisms.

RECOMMENDATIONS

- Continue to stock Brown Trout at HWY J to provide anglers a stream fishing opportunity.
- To utilize habitat improvement and stocking if the Brook Trout population does not continue to show improvement.
- Actively utilize stream bank protection programs (CRP, CREP) to maximize stream bank protection. Encourage land owners to protect wetlands and springs in the watershed to maintain stream flow patterns and cold water temperatures.
- Continue to monitor these stream locations in the future to determine the status of fish populations and identify trends in the brook trout population in the upper East Twin River.
- Work with other DNR staff who issue WPDES permits to make sure that discharge limits protect trout and coldwater water community of the East Twin River.

REFERENCES

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Appendix 1. The East Twin River fish catch by location and year from 2001 through 2015.

	Townline Rd. (above HWY 29)				Krok Rd.			HWY J				Krok Road Bridge
Species	2001	2009	2011	2015	2009	2011	2015	2001	2009	2011	2015	2015
Brook Trout	3	20	18	16			1					2
Central Mudminnow	8	42	14	8	78	55	30	21		105	70	54
Brook Lamprey	2	7	3					2	4	3		
Mottled Sculpin	41	78	39	12	7	3	16	11	27	29	18	11
White Sucker	1	1			13	9	9	44	34	31	21	
Creek Chub		1		1	20	6	34	48	111	61	56	3
Pearl Dace	10	13		3	42	1	68	5	15	3	10	62
Common Shiner					1		29	29	68	5	29	7
Hornyhead Chub								13	34	24	27	
Brook Stickleback	11			2				2	3	26	2	
Southern Redbelly Dace								18	28	12	16	
Redside Dace					1		7		3	7	1	
Finescale dace				2								
Johhny Darter	1							18	3	6	1	1
Blacknose Dace		1			1			5	7	3		
Rainbow Trout									1		2	
Longnose Dace	1							1	1			
Yellow perch											1	
Green Sunfish											2	
Brown Trout								2			9	
Bluntnose Minnow								4				
Total	78	163	74	44	163	74	194	223	339	315	265	140